In The Claims:

Claim 1. (currently amended) A gap-filling process, comprising the steps of:

providing a substrate having a dielectric layer thereon, wherein the dielectric layer has an opening therein;

forming a gap-filling material layer over the dielectric layer and inside the opening, wherein material constituting the gap-filling material layer is a photoresist material or a bottom anti-reflection coating material ;

removing a portion of the gap-filling material from the gap-filling material layer to expose the dielectric layer; and

conducting a gap-filling material treatment for forming a protective layer on an exposed surface of the gap-filling material layer, wherein the protective layer is not formed over the entire substrate but formed on the exposed surface of the gap-filling material layer;

wherein the gap-filling material treatment includes conducting an ultra-violet curing or a chemical immersion.

Claims 2-3 (canceled)

Claim 4. (currently amended) The gap-filling process of claim 1, wherein steps for treating the gap-filling material include:

etching the dielectric layer and the gap-filling material layer; and

forming the protective layer on the exposed surface of the gap-filling material layer by conducting ~~a plasma treatment,~~ an ultra-violet curing or a chemical immersion.

Claim 5. (original) The gap-filling process of claim 1, wherein the step of removing a portion of the gap-filling material from the gap-filling material layer includes etching or chemical-mechanical polishing.

Claim 6. (currently amended) The gap-filling process of claim 1, wherein ~~material constituting the gap-filling material layer is selected from a group consisting of~~ the photoresist material comprises I-line photoresist or deep ultra-violet photoresist ~~and bottom anti-reflection coating~~.

Claim 7. (original) The gap-filling process of claim 1, wherein the step of forming the gap-filling material layer includes spin coating.

Claim 8. (original) The gap-filling process of claim 1, wherein after the step of treating the gap-filling material on the gap-filling material layer and the dielectric layer, further includes forming a bottom anti-reflection coating over the gap-filling material layer and the dielectric layer.

Claim 9. (original) The gap-filling process of claim 1, wherein the opening is selected from a group consisting of a via opening, a contact opening, a trench and a dual damascene opening.

Claim 10. (currently amended) A gap-filling process for fabricating a dual damascene structure, comprising the steps of:

providing a substrate;

sequentially forming a protective layer, a first dielectric layer, an etching stop layer, a second dielectric layer and a cap layer over the substrate;

forming a via opening passing through the first dielectric layer, the etching stop layer, the second dielectric layer and the cap layer;

forming a gap-filling material layer over the cap layer and inside the via opening, wherein material constituting the gap-filling material layer is a photoresist material or a bottom anti-reflection coating material;

removing a portion of the gap-filling material from the gap-filling material layer to expose the cap layer; and

conducting a gap-filling material treatment for forming a protective layer on an exposed surface of the gap-filling material layer, wherein the protective layer is not formed over the entire substrate but formed on the exposed surface of the gap-filling material layer;

wherein the gap-filling material treatment includes conducting an ultra-violet curing or a chemical immersion.

Claim 11-12 (canceled)

Claim 13. (currently amended) The gap-filling process of claim 10, wherein steps for treating the gap-filling material includes:

etching the cap layer and the gap-filling material layer; and

forming the protective layer on the exposed surface of the gap-filling material layer by conducting ~~a plasma treatment,~~ an ultra-violet curing or a chemical immersion.

Claim 14. (original) The gap-filling process of claim 10, wherein the step of removing a portion of the gap-filling material from the gap-filling material layer includes etching or chemical-mechanical polishing.

Claim 15. (original) The gap-filling process of claim 10, wherein the step of forming the gap-filling material layer includes spin coating.

Claim 16. (currently amended) The gap-filling process of claim 10, wherein ~~material constituting the gap-filling material layer is selected from a group consisting of~~ the photoresist material comprises I-line photoresist~~,~~ or deep ultra-violet photoresist ~~and bottom anti-reflection coating~~.

Claim 17. (original) The gap-filling process of claim 10, wherein after the step of treating the gap-filling material on the gap-filling material layer and the cap layer, further includes forming a bottom anti-reflection coating over the gap-filling material layer and the dielectric layer.